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$$\therefore s_1 = s_2 \tan (x \sin \alpha). \quad (4)$$

Substituting this in (2) we obtain

$$s_2 = e^{-x \cos \alpha} \cos (x \sin \alpha),$$

and by (4)

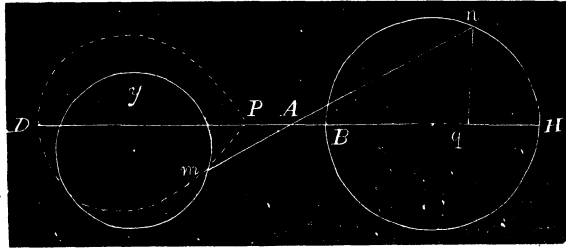
$$s_1 = e^{-x \cos \alpha} \sin (x \sin \alpha).$$

[Mr. Kummell has also sent us a solution of prob. 266, done by a method similar to the above.]

SOLUTION OF PROB. 85 (SEE P. 193, VOL. II) BY PROF. W. P. CASEY.

Let mn be the given line, passing through the given point A , BnH and my the given circles.

Through the given p't A , draw the diameter BH , and make HP and BD each $= mn$, $\therefore P$ and D are given points, and are in the locus of the point m .



Draw ng perpendicular to BH . Let $Ag = x$, $gn = y$, $BH = d$, $AB = a$, $mn = h$; then $ng^2 = Bg \times gH$, or $y^2 = (x-a)(a+d-x) = (x-a)(c-x)$ (if $c = a+d$), and $y^2 = -x^2 + (a+c)x - ac$. Let $An = r$, $\angle A = \theta$, then $y = r \sin \theta$, $x = r \cos \theta$; \therefore by substitution $r^2 \sin^2 \theta = -r^2 \cos^2 \theta + (a+c)r \cos \theta - ac$, and $r^2 - (a+c)r \cos \theta = -ac$;

$$\therefore r = \frac{1}{2} \{ (a+c) \cos \theta \pm \sqrt{[(a+c) \cos^2 \theta - 4ac]} \}.$$

Because $Am = mn - An = h - r$, by giving successive values to θ , and taking the corresponding values of r , the curve, which is the locus of m , will be traced. The curve is an oval, whose axis $PD = BH = d$. The point m is therefore given and the line mn is in position.

[Prof. Casey also discusses the case when $An - Am$ is given, but our space will not permit its insertion.]

CONSTRUCTION OF THE METIAN RATIO BY PROF. CHASE.—Make $AB = 7$; $BC = 8$; $BD = 9$; $DF = 15$; $AE = AC$; AB perpendicular to CD and DF perpendicular to AD , and draw EG parallel to FC . $AF \div AG = 355 \div 113 = 3.14159292+$, π being 3.14159265 .

The error is less than one one hundred and sixteen thousandths of one per cent.

